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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/719,526	12/13/2000	Kazuhito Hatoh	10059-368US	8925
570	7590	08/16/2004	EXAMINER	
AKIN GUMP STRAUSS HAUER & FELD L.L.P. ONE COMMERCE SQUARE 2005 MARKET STREET, SUITE 2200 PHILADELPHIA, PA 19103-7013			CREPEAU, JONATHAN	
			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 08/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/719,526

Applicant(s)

HATOH ET AL.

Examiner

Jonathan S. Crepeau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,4,6 and 8-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4,6 and 8-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office action addresses claims 1, 4, 6, and 8-11. Although the claims have been amended, they remain rejected for substantially the reasons of record. Accordingly, this action is made final.

### ***Claim Rejections - 35 USC § 103***

2. Claims 1, 4, 6, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow et al (U.S. Patent 5,284,718) in view of JP 6-132038.

Regarding claim 1, Chow et al. teach a fuel cell comprising an active section and a humidification section (see Fig. 1). Each unit cell in the active section is formed from electrode catalyst layers sandwiching a first polymer electrolyte membrane and separator plates containing reactant grooves (see col. 6, line 49 et seq.). The stack further contains an insulating plate (14), a piston plate (17), current collector (bus) plates (20, 21), and end plates (11, 12). Regarding claims 1 and 8, the humidification section contains humidification units which comprise a second polymer membrane (43) sandwiched by carbon paper sheets (44, 50) and flow plates (41, 39) (see Fig. 13; col. 10, lines 21-41). The humidification units function by transferring water from a liquid water stream across the membrane to an incoming reactant gas. The humidification section contains oxidant humidifying plates (41) on the left side thereof and fuel humidifying plates (42) on the right side thereof (see Fig. 1). Regarding claim 4, the first and second polymer

membranes are the same (see col. 10, line 25). Regarding claims 1 and 9, a plurality of unit cells and a plurality of humidification units are disposed within the endplates of the stack (see Fig. 1). Regarding claim 10, the humidification units are installed between a current collector plate (21) and the piston plate (17) (see Fig. 1). Regarding claim 11, the humidification units are installed between the insulating plate (14) and an end plate (12) (see Fig. 1). Regarding claims 1 and 6, the first and second membranes may have a thickness of 0.0035 inches (89 microns) (see col. 7, line 16).

Chow et al. do not expressly teach that an incoming gas is contacted with a discharged gas in the humidification units, as recited in claim 1. The reference further does not teach that the thickness of the second polymer membrane is less than 50 or 25 microns, as recited in claims 1 and 6, or that the piston plate is electrically insulating, as recited in claim 10. The reference also does not teach that the fuel humidifying plates alternate with the oxidant humidifying plates, as recited in claim 1.

However, the latter limitation is not considered to distinguish over the reference because it merely represents the rearrangement of the humidifying plates of Chow. The oxidant plates of the humidification section of Chow are on the left side thereof and the fuel plates on the right side thereof. The rearrangement of these plates into an alternating configuration would be well within the skill of the art and is not considered to involve an inventive step. Generally, such a rearrangement of parts is not considered to distinguish over a reference (MPEP §2144.04(VI)).

Additionally, the thickness of the membranes is a parameter that is recognized by the prior art as being a result-effective variable. See, for example, column 7, lines 1-20 of Chow et al., which discusses the merits of a thinner membrane. Thus, the artisan would have sufficient

motivation to make the membranes thinner than 89 microns, the value disclosed in the passage. It has been held that the discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Further, the artisan would be sufficiently skilled to ascertain that the piston plate (17) of Chow would be electrically insulating, as is required by claim 10. The plate lies outside the area sandwiched by the bus plates (20, 21) which are used to collect current from active section of the stack. An electrically insulating member would be desirable at the end of the stack adjacent to the humidification section in order to prevent electrical current from “leaking” from the end of the stack. Accordingly, the artisan would be able to ascertain that the piston plate (17) has an electrically insulating function.

Additionally, in the abstract and Figure 1, JP 6-132038 teaches an apparatus comprising a fuel cell stack (10) in combination with total heat exchangers (11, 21) for concurrently moving heating and humidity from discharged gases toward the incoming fuel and oxidant gases (see abstract; Fig. 1).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of JP ‘038 to flow incoming and discharged gases through the humidification units of Chow et al. to effect heat and humidity exchange between the gases. In the abstract, JP ‘038 teaches that the purpose of the invention is to provide a system in which a “stable amount of humidification is obtained in accordance with a change in the amount of reaction gas, the miniaturization and the capacity increase of which is easy to make.” Further, in paragraph 18 of the machine translation, JP ‘038 teaches that the apparatus does not need a supply of an external

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heat source or water, that “easy steam humidification equipment” can be used, and that “the reactant gas which corresponded to change of a load without retardation, and humidified and preheated can be supplied to a fuel cell.” Accordingly, the artisan would be motivated to flow a discharged gas instead of a liquid water stream through the humidifiers of Chow et al. in hopes of obtaining these advantages.

### *Response to Arguments*

3. Applicant's arguments filed June 7, 2004 have been fully considered but they are not persuasive. Applicants assert that, regarding the amendatory language of claim 1, “Applicants have found this alternating arrangement of the fuel and oxidant humidification units to be particularly efficient for both humidification and heat exchange.” However, it is submitted that neither the instant specification nor the disclosure of Chow ascribes any criticality to the respective arrangements of the fuel and oxidant plates. The instant specification merely states that the unit humidifiers are alternately arranged, and Chow discloses that the plates are grouped on respective sides but does not appear to discuss the significance of this arrangement. As such, the rearrangement of the plates of Chow would not appear to have an effect on the operation of the fuel cell or the humidification section, and as such, the claimed arrangement of plates does not appear to have any particular criticality.

Applicants further assert that the Examiner's reliance on col. 7 lines 1-20 of Chow as providing motivation for using a thin membrane in the humidifiers is misplaced because this

passage is relevant to membranes that are used in the fuel cells. However, Chow states that the membranes used in the fuel cells and the membranes used in the humidifiers are substantially identical (see col. 10, line 25). Therefore, it is believed that the artisan would be sufficiently guided to use the same membrane in all the units (fuel cell units and humidification units) of Chow, and thus, the claimed thickness ranges are still believed to be rendered obvious by the reference.

#### *Conclusion*

4. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr, can be reached at (571) 272-1414. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jonathan Crepeau  
Patent Examiner  
Art Unit 1746  
August 11, 2004